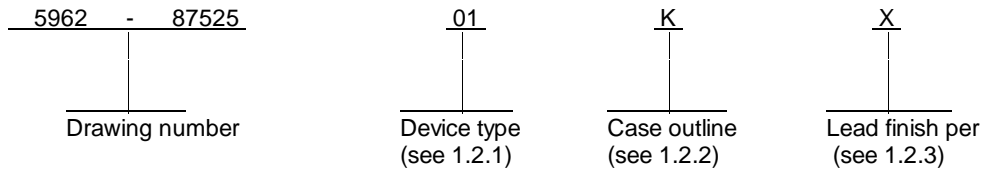


DESC FORM 193
JUL 91
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part or Identifying Number. The complete PIN shall be as shown in the following example:



1.2.1 Device type(s). The device type(s) shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	29C821	High performance CMOS 10-wide bus interface register
02	29C823	High performance CMOS 9-wide bus interface register
03	29C921	High performance CMOS 10-wide bus interface register (rotated die) <u>1/</u>
04	29C921	High performance CMOS 9-wide bus interface register (rotated die) <u>1/</u>
05	29C821A	High performance CMOS 10-wide bus interface register (edge-rate controlled outputs)
06	29C823A	High performance CMOS 9-wide bus interface register (edge-rate controlled outputs)

1.2.2 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835, and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
K	GDFP2-F24 or GDFP3-F24	24	flat package
L	GDIP3-T24 or CDIP2-T24	24	dual-in-line package
3	CQCC1-N28	28	square leadless-chip-carrier

1.2.5 Lead finish. The lead finish shall be as specified in MIL-M-38510. Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

1/ Not available from an approved source of supply.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
2

1.3 Absolute maximum ratings.

Supply voltage range (V_{CC})	-0.5 V dc to +6.0 V dc
Storage temperature range	-65° C to +150° C
DC input voltage range	
Devices 01-04	-0.5 V dc to $V_{CC} + 0.5$ V dc
Devices 05,06	-0.5 V dc to +6.0 V dc
DC output voltage range	
Devices 01-04	-0.5 V dc to $V_{CC} + 0.5$ V dc
Devices 05,06	-0.5 V dc to +6.0 V dc
DC output diode current: Into output	
All devices	+50 mA
DC output diode current: Out of output	
All devices	-50 mA
DC input diode current: Into output	
All devices	+20 mA
DC input diode current: Out of output	
All devices	-20 mA
DC output current per pin (I_{sink})	
Devices 01-04	+48 mA (2 x I_{OL})
Device 05,06	+100 mA
DC output current per pin (I_{source})	
Devices 01-04	-30 mA (2 x I_{OL})
Device 05,06	-100 mA
Total dc ground current	(n x I_{OL} + m x I_{CCT}) mA <u>1/</u>
Total dc V_{CC} current	(n x I_{OL} + m x I_{CCT}) mA <u>1/</u>
Maximum power dissipation (P_D) <u>2/</u>	500 mW
Lead temperature (soldering, 10 seconds)	+300° C
Thermal resistance, junction-to-case (Θ_{JC}):	
Cases L, K and 3	See MIL-STD-1835
Junction temperature (T_J)	+150° C

1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	+4.5 V dc to +5.5 V dc
Case operating temperature range (T_C)	-55° C to +125° C
Maximum high level input voltage (V_{IH})	2.0 V dc
Maximum low level input voltage (V_{IL})	0.8 V dc

1/ n = number of outputs, m = number of inputs.
2/ For $T_A = +100^\circ\text{C}$ to $+125^\circ\text{C}$ derate linearly at 10mW/°C.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
3

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, bulletin, and bulletin. Unless otherwise specified, the following specifications, standards, and bulletin of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATIONS MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARDS MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-1835 - Microcircuit Case Outlines.

BULLETIN MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

(Copies of the specifications, standards, and bulletin required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements for device class M shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.3 Truth table. The truth table shall be as specified on figure 2.

3.2.4 Logic diagram. The logic diagram shall be as specified on figure 3.

3.3 Electrical performance characteristics and postirradiation parameter limits. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full case operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-EC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88516
		REVISION LEVEL C	SHEET 4

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C 4.5 V ≤ V _{CC} ≤ 5.5 V unless otherwise specified		Group A subgroups	Device type	Limits <u>2/</u>		Unit
						Min	Max	
High level output voltage	V _{OH}	V _{CC} = 4.5 V, I _{OH} = -15.0 mA V _{IN} = V _{IL} , V _{IH}		1, 2, 3	All	2.4		V
Low level output voltage	V _{OL}	V _{CC} = 4.5 V, V _{IN} = V _{IL} , V _{IH}	I _{OL} = 24.0 mA	1, 2, 3	01-04		0.5	V
			I _{OH} = 32.0 mA		05,06		0.5	V
Input clamp voltage	V _{IC}	V _{CC} = 4.5 V, I _{IN} = -18 mA		1, 2, 3	All		-1.2	V
Low level input current	I _{IL1}	V _{CC} = 5.5 V	V _{IN} = 0 V	1, 2, 3	01-04		-10	μA
	I _{IL2}		V _{IN} = 0.4 V		05,06		-5	μA
					01-04		5	μA
High level input current	I _{IH1}	V _{CC} = 5.5 V	V _{IN} = 2.7 V	1, 2, 3	01-04		5	μA
	I _{IH2}		V _{IN} = 5.5 V		01-04		10	μA
					05,06		5	μA
Off state current	I _{OZH}	V _{CC} = 5.5 V	V _{OUT} = 5.5 V	1, 2, 3	All		10	μA
	I _{OZL}		V _{OUT} = 0.0 V	1, 2, 3	All		-10	μA
Output short circuit current	I _{SC}	V _{CC} = 5.5 V, V _{OUT} = 0 V <u>1/</u>		1, 2, 3	aLL	-60		mA
Static supply current	I _{CCQ}	V _{CC} = 5.5 V, outputs open	V _{CC} = 5.5 V or GND	1, 2, 3	01-04		160	μA
					05,06		1500	μA

See footnotes at end of table.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Test conditions -55° C ≤ T _C ≤ +125° C 4.5 V ≤ V _{CC} ≤ 5.5 V unless otherwise specified		Group A subgroups	Device type	Limits 2/		Unit	
						Min	Max		
Static supply current	I _{CCT}	VCC =5.5 V, Outputs open	V _{IN} = 3.4 V			All		1.5	mA/bit
			Data input	OE, CP		01,03 05		3.0	
				OE, EN CLR, CP		02,04,06		3.0	
Input capacitance	C _{IN}	See 4.3.1c		4	All		16	pF	
Output capacitance	C _{OUT}	See 4.3.1c		4	All		20	pF	
Functional testing		See 4.3.1d		7,8	All				
Propagation delay clock (CP) to Y _I	t _{PLH}	See figure 4 C _L = 50 pF R ₁ = 500Ω R ₂ = 500Ω		9,10,11	01-04		14	ns	
					05,06		9.5	ns	
Propagation delay clock (CP) to Y _I	t _{PHL}			9,10,11	01-04		14	ns	
					05,06		9.5	ns	
Propagation delay clear to Y _I	t _{PHL}			9,10,11	01-04		15	ns	
					05,06		10.5	ns	
Propagation delay output enable (OE) to Y _I	t _{PZH}			9,10,11	01-04		14	ns	
					05,06		9	ns	
Propagation delay output enable (OE) to Y _I	t _{PZL}			9,10,11	01-04		14	ns	
					05,06		13	ns	

See footnotes at end of table.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
6

TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions -55° C ≤ T _C ≤ +125° C 4.5 V ≤ V _{CC} ≤ 5.5 V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Propagation delay output disable (OE) to Y _I	t _{PHZ}	See figure 4 CL = 50 pF R ₁ = 500Ω R ₂ = 500Ω	9,10,11	01-04		14	ns
				05,06		8.5	ns
Propagation delay output disable (OE) to Y _I	t _{PLZ}		9,10,11	01-04		14	ns
				05,06		8.5	ns
Data (D _I) to CP setup time	t _S		9,10,11	01-04	6		ns
				05,06	3		ns
Data (D _I) to CP hold time	t _H		9,10,11	01-04	3		ns
				05,06	2		ns
Enable (high to low) to CP setup	t _S		9,10,11	01-04	6		ns
				05,06	4		ns
Enable (low to high) to CP setup	t _S		9,10,11	01-04	6		ns
				05,06	4		ns
Enable hold time	t _H		9,10,11	01-04	3		ns
				05,06	0		ns
Clear (low to high) to CP setup time	t _S		9,10,11	01-04	6		ns
	t _{REC}			05,06	6		ns
Clock low pulse width	t _{PWL}		9,10,11	01-04	11		ns
				05,06	6		ns

See footnotes at end of table.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
7

TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions -55° C ≤ T _C ≤ +125° C 4.5 V ≤ V _{CC} ≤ 5.5 V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Clock high pulse	t _{PWH}		9,10,11	01-04	11		ns
				05,06	6		ns
Clear pulse width	t _{PWL}		9,10,11	01-04	11		ns
				05,06	6		ns

1/ Not more than one output shorted at a time. Duration should not exceed 100 milliseconds.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

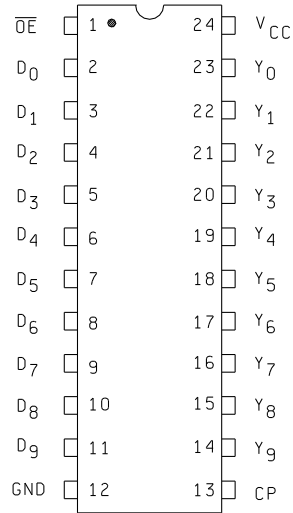
5962-88516

REVISION LEVEL
C

SHEET
8

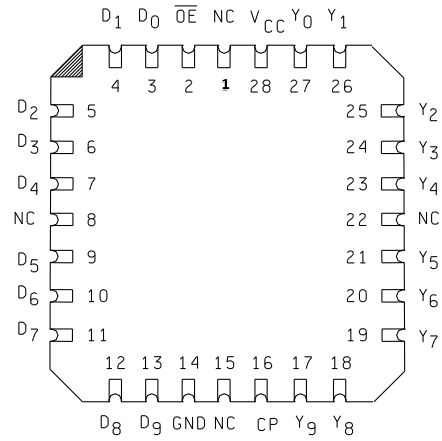
Device types 01 and 05

Cases K and L



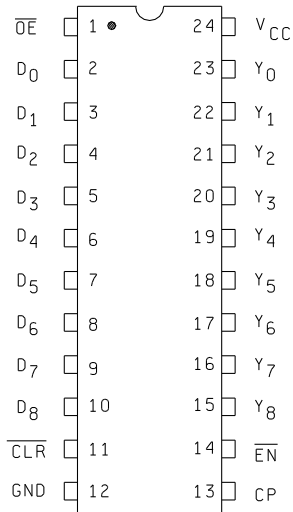
Device types 01 and 05

Case 3



Device types 02 and 06

Cases K and L



Device types 02 and 06

Case 3

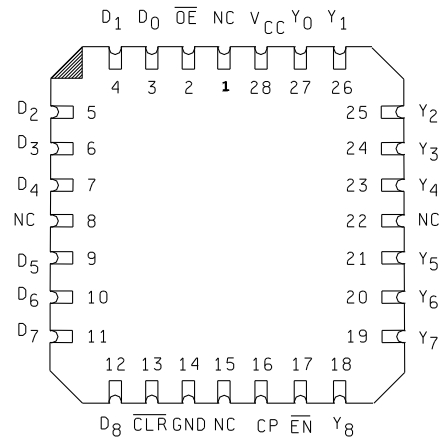


FIGURE 1. Terminal connections.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

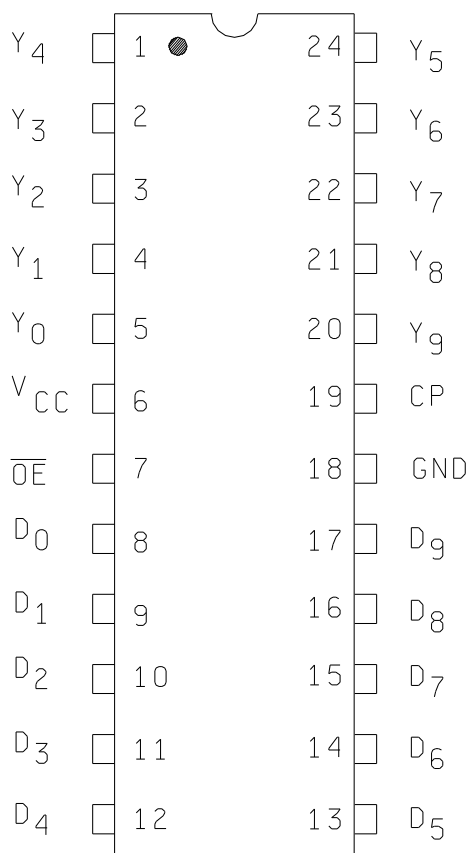
5962-88516

REVISION LEVEL
C

SHEET
9

Device type 03

Case L



Device type 04

Case L

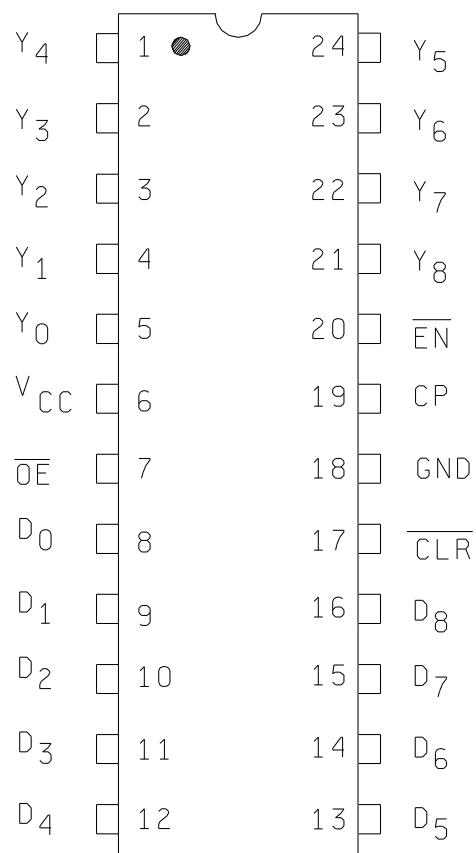


FIGURE 1. Terminal connections - continued.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
10

Device types 01, 03, and 05

Inputs			Internal	Outputs	Function
\overline{OE}	D_i	CP	Q_i	Y_i	
H	L	\uparrow	H	Z	Hi-Z
H	H	\uparrow	L	Z	
L	L	\uparrow	H	L	Load
L	H	\uparrow	L	H	

Device types 02, 04, and 06

Inputs					Internal	Outputs	Function
\overline{OE}	\overline{CLR}	\overline{EN}	D_i	CP	\overline{Q}_i	Y_i	
H	H	L	L	\uparrow	H	Z	Hi-Z
H	H	L	H	\uparrow	L	Z	
H	L	X	X	X	H	Z	Clear
L	L	X	X	X	H	L	
H	H	H	X	X	NC	Z	Hold
L	H	H	X	X	NC	NC	
H	H	L	L	\uparrow	H	Z	Load
H	H	L	H	\uparrow	L	Z	
L	H	L	L	\uparrow	H	L	
L	H	L	H	\uparrow	L	H	

H = high
L = Low
X = Don't care

NC = No change
 \uparrow = Low-to-high transition
Z = High impedance

FIGURE 2. Truth Table.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
11

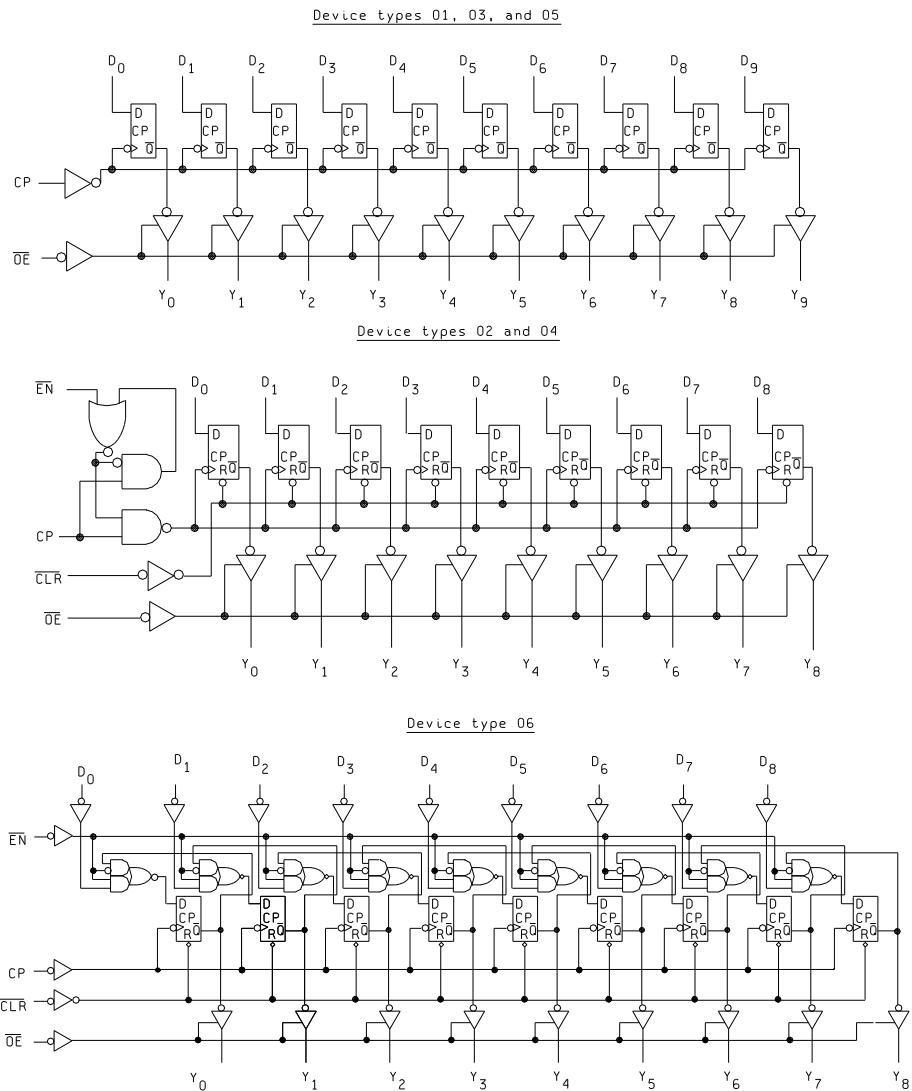


FIGURE 3. Logic diagrams.

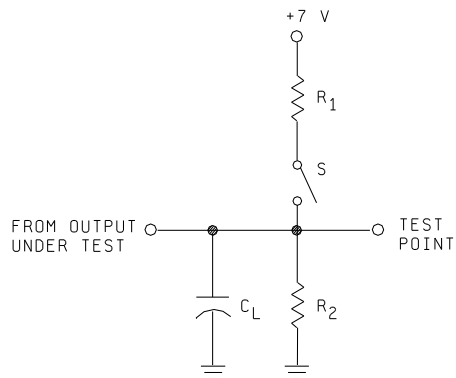
STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88516

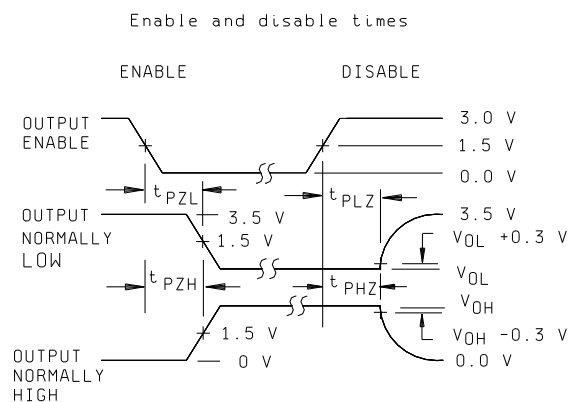
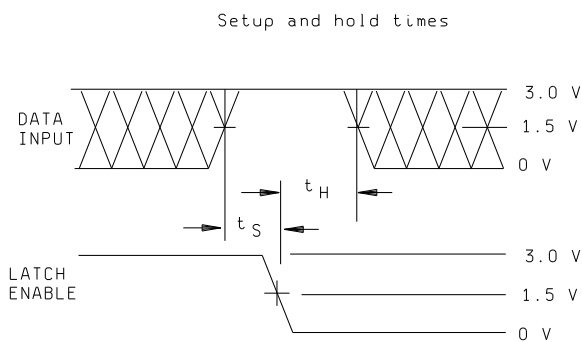
REVISION LEVEL
C

SHEET
12



Load circuit for three-state outputs

Parameter	S Position
t_{PLH}	Open
t_{PHL}	Open
t_{PHZ}	Open
t_{PZH}	Open
t_{PLZ}	Closed
t_{PZL}	Closed



NOTES:

1. Diagram shown for HIGH data only. Output transition may be opposite sense.
2. Cross hatched area is don't care condition.

FIGURE 4. Test circuit and switching waveforms.

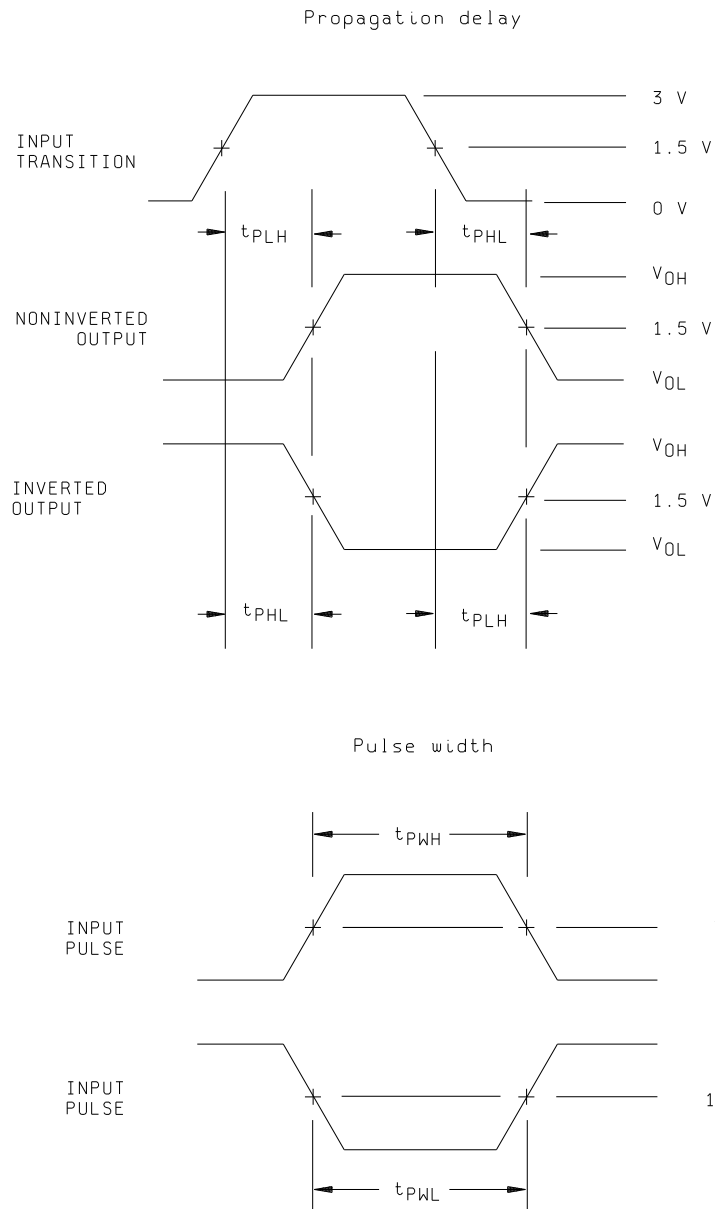
STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

REVISION LEVEL
C

5962-88516

SHEET
13



NOTE: Pulse generator for all pulses rate ≤ 1.0 Mhz; $Z_o = 500\Omega$;
 $t_r \leq 2.5$ ns; $t_f \leq 2.5$ ns.

FIGURE 4. Test circuit and switching waveforms - cotinued.

STANDARDIZED
 MILITARY DRAWING
 DEFENSE ELECTRONICS SUPPLY CENTER
 DAYTON, OHIO 45444

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
14

3.8 Notification of change. Notification of change to DESC-ec shall be required in accordance with MIL-STD-883 (see 3.1 herein)

3.9 Verification and review. DESC, DESC's agent, and acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the requirements for inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

(2) $T_A = +125^{\circ}\text{C}$, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroups 4 (C_{IN} and C_{OUT} measurements) shall be measured only for the initial test and after process or design changes which may affect input capacitance.

d. Subgroups 7 and 8 shall include verification of the truth tables.

4.3.2 Group Cand D inspections.

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions, method 1005 of MIL-STD-883.

(1) Test condition A, C or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the requirements for inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

(2) $T_A = +125^{\circ}\text{C}$, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
15

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with 5005, table I)
Interim electrical parameters (method 5004)	- - -
Final electrical test parameters (method 5004)	1*, 2, 3, 7*, 8, 9, 10, 11
Group A test requirements (method 5004)	1, 2, 3, 7, 8, 9, 10, 11
Group C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroups 1 and 7.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for original equipment manufacturer application. When a military specification exists and the product covered by this drawing has been qualified listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DESC-EC, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EC, Dayton, Ohio 45444, or telephone (513) 296-5377.

6.6 Approved sources of supply. Approved sources of supply is listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-EC.

**STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444**

SIZE
A

5962-88516

REVISION LEVEL
C

SHEET
16

STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE : 92-12-11

Approved sources of supply for SMD 5962-88516 are listed below for immediate acquisition only and shall be added to MIL-BUL-103 during the next revision. MIL-BUL-103 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DESC-EC. This bulletin is superseded by the next dated revision of MIL-BUL-103.

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN <u>1/</u>
5962-8851601LX	34335	AM29C821/BLA
5962-8851601KX	34335	AM29C821/BKA
5962-88516013X	34335	AM29C821/B3A
5962-8851602LX	34335	AM29C823/BLA
5962-8851602KX	34335	AM29C823/BKA
5962-88516023X	34335	AM29C823/B3A
5962-8851603LX	<u>2/</u>	AM29C921/BLA
5962-8851604LX	<u>2/</u>	AM29C923/BLA
5962-8851605LX	34335	AM29C821A/BLA
5962-8851605KX	34335	AM29C821A/BKA
5962-88516053X	34335	AM29C821A/B3A
5962-8851606LX	34335	AM29C823A/BLA
5962-8851606KX	34335	AM29C823A/BKA
5962-88516063X	34335	AM29C823A/B3A

- 1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.
- 2/ Device types 03 and 04 inactive for new design. Not available from an approved source.

Vendor CAGE
number

34335

Vendor name
and address

Advanced Micron Devices, Incorporated
901 Thompson Place
P.O. Box 3453
Sunnyvale, CA 94088

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in this information bulletin.